HMC463LP5

GaAs PHEMT MMIC LOW NOISE AGC AMPLIFIER, 2.0 - 20.0 GHz

Typical Applications

The HMC463LP5 is ideal for:

- Telecom Infrastructure
- Microwave Radio & VSAT
- Military EW, ECM & C³I
- Test Instrumentation
- Fiber Optics

Features

Gain: 13 dB

Noise Figure: 2.8 dB @ 10 GHz

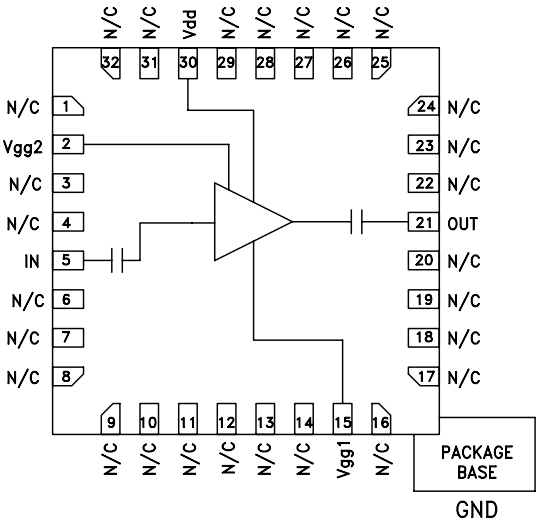
P1dB Output Power: +18 dBm @ 10 GHz

Supply Voltage: +5.0V @ 60 mA

50 Ohm Matched Input/Output

25 mm² Leadless Package

Functional Diagram



Vgg2: Optional Gate Bias for AGC

General Description

The HMC463LP5 is a GaAs MMIC PHEMT Low Noise AGC Distributed Amplifier packaged in a leadless 5 x 5 mm surface mount package which operates between 2 and 20 GHz. The amplifier provides 13 dB of gain, 3.0 dB noise figure and 18 dBm of output power at 1 dB gain compression while requiring only 60 mA from a +5V supply. An optional gate bias (Vgg2) is provided to allow Adjustable Gain Control (AGC) of 8 dB typical. Gain flatness is excellent at ±0.5 dB from 6 - 18 GHz making the HMC463LP5 ideal for EW, ECM RADAR and test equipment applications. The HMC463LP5 LNA I/Os are internally matched to 50 Ohms and are internally DC blocked.

Electrical Specifications, T_A = +25° C, Vdd= 5V, Idd= 60 mA*

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range		2.0 - 6.0			6.0 - 18.0			18.0 - 20.0		GHz
Gain	10	13		9	12		8	11		dB
Gain Flatness		±0.5			±0.5			±0.5		dB
Gain Variation Over Temperature		0.010	0.015		0.010	0.015		0.010	0.015	dB/ °C
Noise Figure		3.0	4.0		3.0	5.0		5.5	6.5	dB
Input Return Loss		15			13			12		dB
Output Return Loss		13			10			10		dB
Output Power for 1 dB Compression (P1dB)	16	19		11	16		10	12		dBm
Saturated Output Power (Psat)		21			19			19		dBm
Output Third Order Intercept (IP3)		30			24			22		dBm
Supply Current (Idd) (Vdd= 5V, Vgg1= -0.9V Typ.)		60			60			60		mA

** Adjust Vgg1 between -2 to -0V to achieve Idd= 60 mA typical.*

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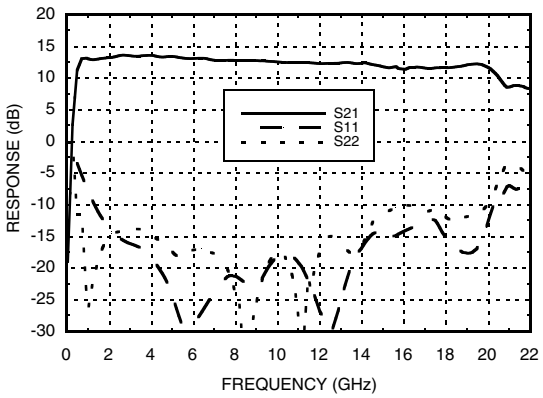
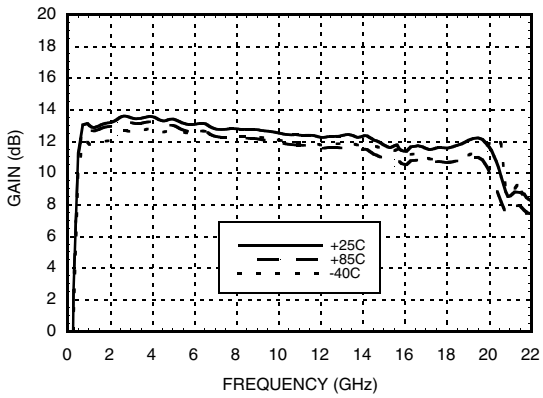
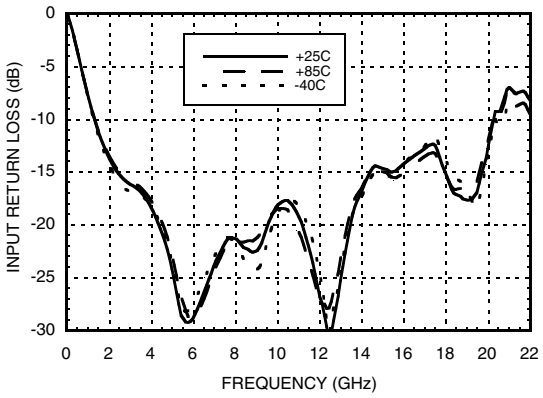
Gain & Return Loss



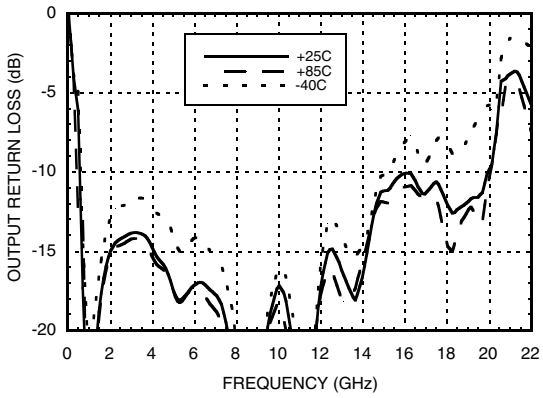
Gain vs. Temperature



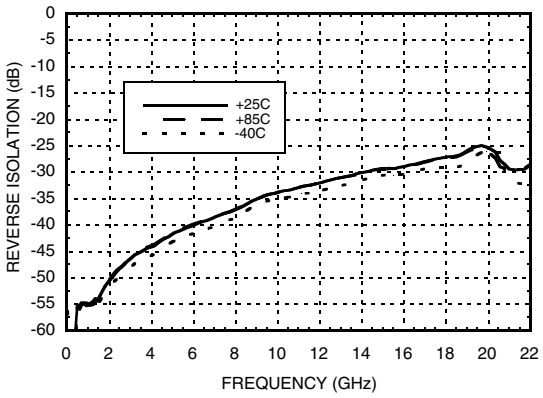
Input Return Loss vs. Temperature



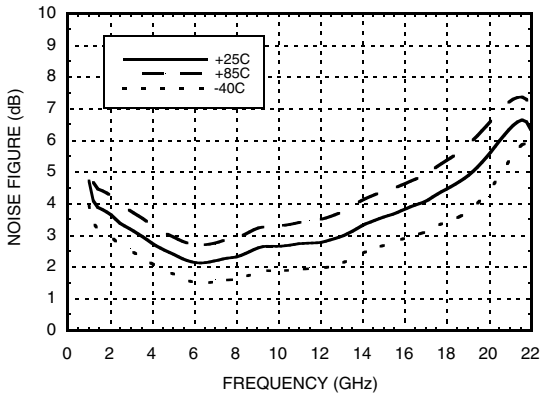
Output Return Loss vs. Temperature



Reverse Isolation vs. Temperature



Noise Figure vs. Temperature



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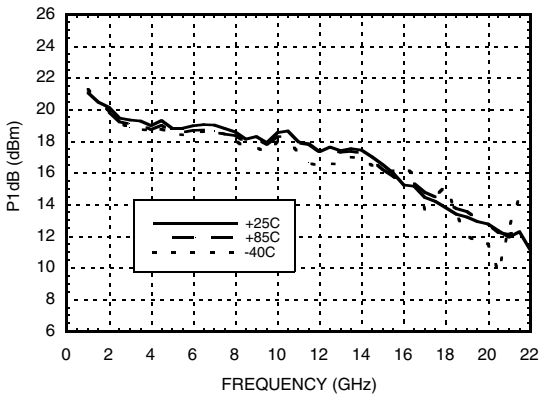
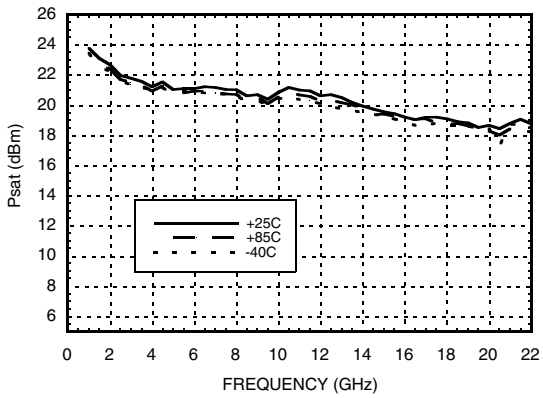
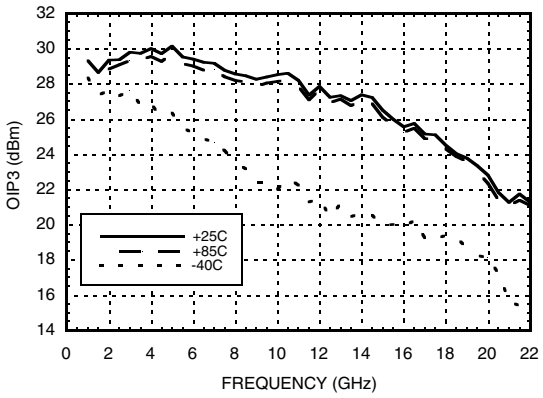
P1dB vs. Temperature



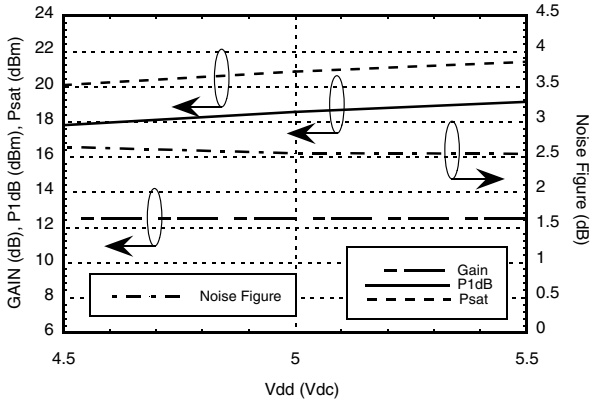
Psat vs. Temperature



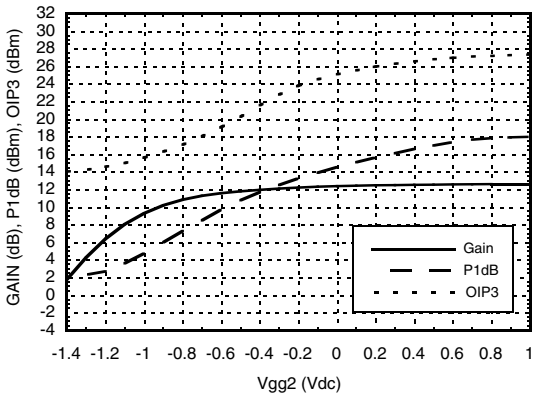
Output IP3 vs. Temperature



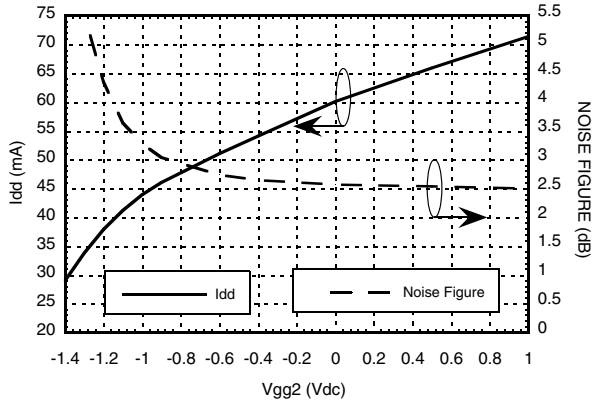
Gain, Power & Noise Figure vs. Supply Voltage @ 10 GHz, Fixed Vgg1



Gain, P1dB & Output IP3 vs. Control Voltage @ 10 GHz



Noise Figure & Supply Current vs. Control Voltage @ 10 GHz



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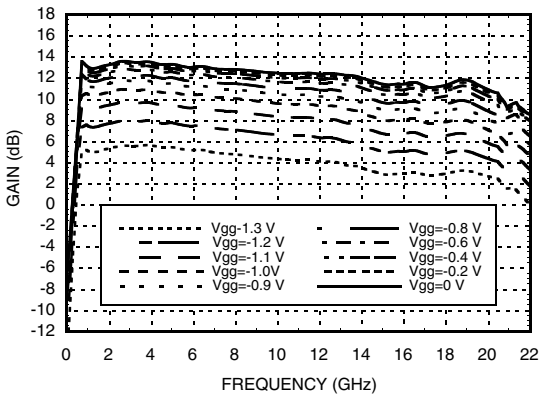
Gain @ Several Control Voltages



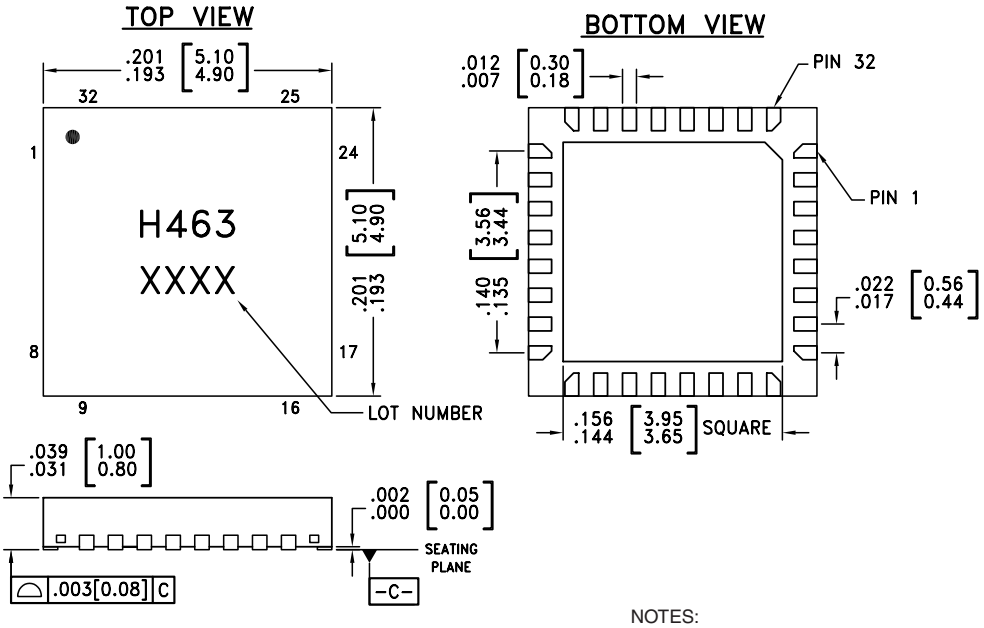
Absolute Maximum Ratings

Drain Bias Voltage (Vdd)	+9.0 Vdc
Gate Bias Voltage (Vgg1)	-2.0 to 0 Vdc
Gate Bias Voltage (Vgg2)(AGC)	(Vdd -9.0) Vdc to +2.0 Vdc
RF Input Power (RFin)(Vdd = +5.0 Vdc)	+23 dBm
Channel Temperature	150 °C
Continuous Pdiss (T= 85 °C) (derate 50 mW/°C above 85 °C)	3.25 W
Thermal Resistance (channel to ground paddle)	20 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

Typical Supply Current vs. Vdd

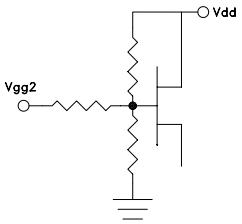
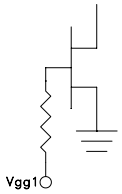
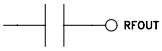
Vdd (V)	Idd (mA)
+4.5	58
+5.0	60
+5.5	62

Outline Drawing

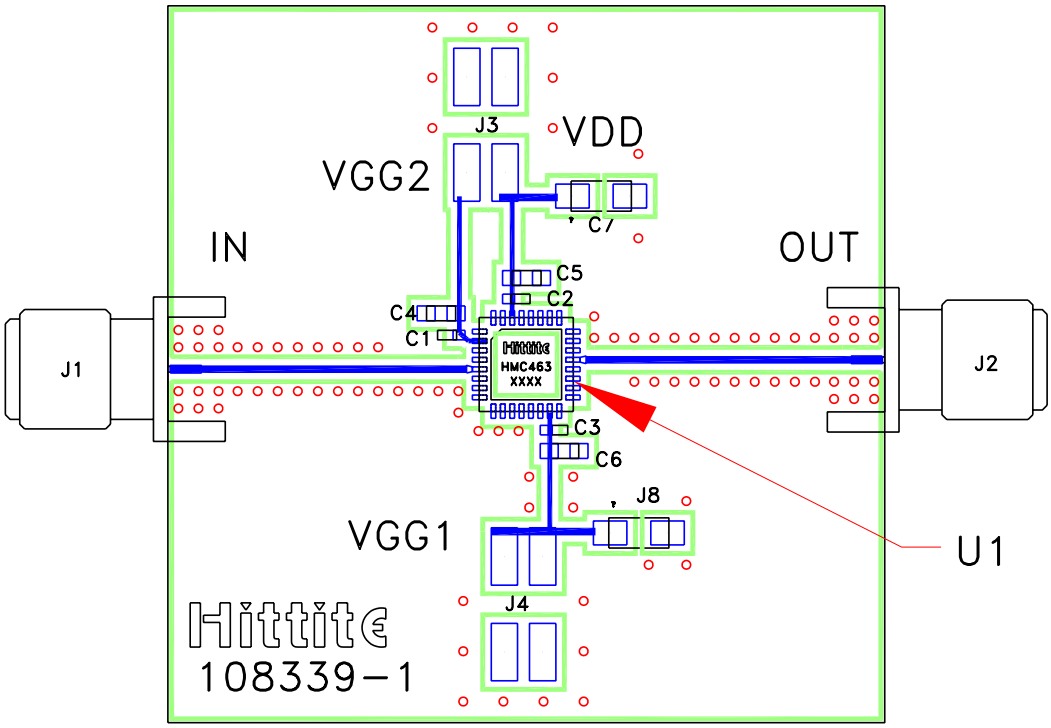


NOTES:
1. ALL DIMENSIONS IN INCHES [MILLIMETERS]
2. NO CONNECTION REQUIRED FOR UNLABELED BOND PADS
3. DIE THICKNESS IS 0.004 (0.100)
4. TYPICAL BOND PAD IS 0.004 (0.100) SQUARE
5. BACKSIDE METALLIZATION: GOLD
6. BACKSIDE METAL IS GROUND
7. BOND PAD METALIZATION: GOLD

Pad Descriptions

Pad Number	Function	Description	Interface Schematic
1, 3, 4, 6-14, 16-20, 22-29, 31, 32	N/C	No connection. These pins may be connected to RF ground. Performance will not be affected.	
2	Vgg2	Optional gate control if AGC is required. Leave Vgg2 open circuited if AGC is not required.	
5	RFIN	This pad is AC coupled and matched to 50 Ohms from 2.0 - 20.0 GHz	
15	Vgg1	Gate control for amplifier. Adjust to achieve Idd= 60 mA.	
21	RFOUT	This pad is AC coupled and matched to 50 Ohms from 2.0 - 20.0 GHz	
30	Vdd	Power supply voltage for the amplifier. External bypass capacitors are required	
Ground Paddle	GND	Grpund paddle must be connected to RF/DC ground.	

Evaluation PCB



List of Materials for Evaluation PCB 108341*

Item	Description
J1 - J2	SRI K Connector
J3 - J4	2 mm Molex Header
C1 - C3	100 pF Capacitor, 0402 Pkg.
C4 - C6	1000 pF Capacitor, 0603 Pkg.
C7 - C8	4.7 µF Capacitor, Tantalum
U1	HMC463LP5
PCB**	107339 Evaluation PCB
** Circuit Board Material: Rogers 4350	

* Reference this number when ordering complete evaluation PCB.

The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 ohm impedance while the package ground leads and package bottom should be connected directly to the ground plane similar to that shown. A sufficient number of VIA holes should be used to connect the top and bottom ground planes. The evaluation board should be mounted to an appropriate heat sink. The evaluation circuit board shown is available from Hittite upon request.